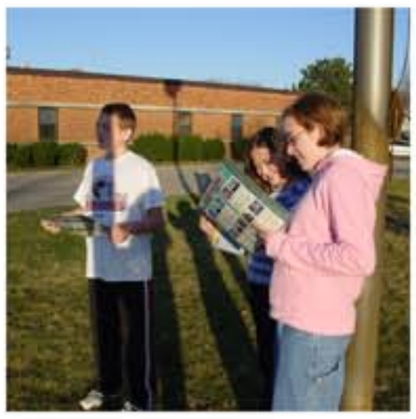
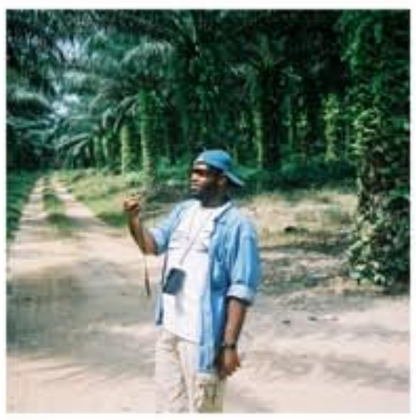
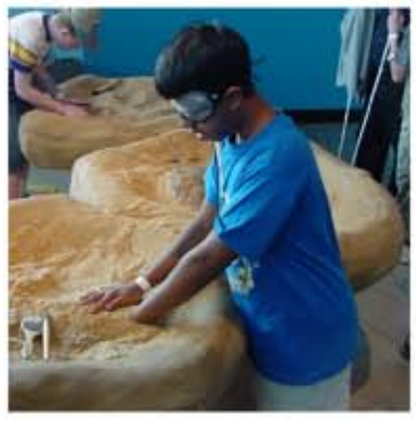
National Aeronautics and
Space Administration







This monthly series on the NASA portal features NASA Earth Explorers of all ages with a variety of backgrounds and interests.

Meet this month's Earth Explorer
http://science.hq.nasa.gov/education/earth_explorers

http://www.nasa.gov

Who are NASA Earth Explorers?

The young student fascinated by images of Earth from space. The scientist drilling Antarctic ice cores to understand Earth's climate history. The teacher explaining how different parts of the Earth system are connected. And the citizen-scientist investigating how the Sun's variability impacts life on Earth. They all use NASA Earth science imagery, data and knowledge to satisfy their curiosity about the Earth system.

Explore. Discover. Understand.

Who are NASA Earth **Explorers?**

The Earth Explorers Series on the NASA portal features NASA Earth Explorers, young and old, with many backgrounds and interests. Each article is written for three different reading levels: grades K-4, grades 5-8, and grades 9-12 and up. New articles are added each month and can be accessed through the "For Educators" and "For Students" sections of the NASA portal (www.nasa.gov/home). The full collection of articles is available at *http://science.hq.nasa.gov/education/earth_explorers*.

Kittrell Elementary

For Grades 5-8

Spring was finally in the air and flowers were blooming. All winter long, a group of fifth-graders at Kittrell Elementary School in Iowa had been closely watching the weather. They were trying to study how temperature and clouds affect bursting tree buds. But excitement quickly turned to dismay one morning in April. The students arrived at school to find their outdoor weather box had been bashed. And their new digital thermometer was gone. This wasn't exactly their idea of a friendly April Fools' prank.

Claire Parkinson

For Grades K-4

Claire Parkinson is a NASA scientist. She studies sea ice and climate. Sea ice is found at the top of oceans near the North and South poles. Sea ice covers huge areas. And it reflects sunlight back to space. It also protects ocean water from cold air. Satellite data helps Claire track changes in sea ice. She uses computers to map and plot the data. The results can be surprising and exciting. All of this work helps us learn new things about the Earth system.

Adam Johnson

For Grades 9-12 and up

Adam Johnson's approximately 24-hour, 5,000-mile trip from Baltimore, Md., to the western coast of Ghana earlier this year was the longest he had ever taken. But it was nothing compared to the months-long reverse journey—from the shores of West Africa to the Americas—that millions of enslaved Africans were forced to experience centuries earlier. Unlike his oppressed ancestors, Johnson, an undergraduate at Baltimore's Coppin State University, traveled in January to Africa's Cape Coast out of his own volition.

Steven and Amelia

For Grades K-4

Steven is 14 years old and Amelia is 12 years old. Both of them are blind. Yet they did pretty well at a science camp this past summer. They were able to measure how warm or cool it was with a thermometer. And they measured rainfall with a rain gauge. Their secret? Steven and Amelia were using a talking thermometer. And the rain gauge had Braille on it. Braille is a type of raised writing. Blind people read it by touching it with their fingers.

More NASA Earth Explorers

It Takes a Village
For Grades 9-12 and up

In the hours after a massive earthquake rocked the bottom of the Indian Ocean, some scientists feared that a dangerous tsunami could follow. An inadequate international system for spreading word of the potential threat,which soon became all too real, hindered warning from reaching many people in South Asia. Long before the deadly waves triggered efforts to improve the way environmental information is communicated among nations, John Moore and Jens Jensen realized the importance of instilling in the next generation of scientists the value of sharing Earth-related data.

Robbie Hood
For Grades K-4

Flying through a hurricane isn't as scary as it sounds. At least that's what Robbie Hood says. Hood is a NASA scientist. She's flown on airplanes into the middle of hurricanes. Sensors on the plane gather data about the storm. The data is used to study and predict hurricanes. But why send an airplane into the center of a fierce storm? Can't satellites just look at it from space? The airplane and satellite data together give a more detailed view of how hurricanes work.

Lee Fu
For Grades 9-12 and up

Exploring the ocean is easier said than done. Stare as long and hard as you want at the ocean and you still can't see much past the water's surface. The inability to easily observe the ocean is, in part, what makes it so mysterious and fascinating. Yet, with the help of satellites in space, scientists like NASA's Lee-Lueng Fu have managed to uncover many of the ocean's secrets by looking at its surface alone.

Abigail
For Grades 5-8

Abigail has always liked exploring and studying the world around her. She enjoys looking at beautiful skies and staring at the stars with her telescope. And she likes going to science lectures at Princeton University. She got interested in Earth science with the help of her dad who also enjoys looking at stars. In seventh grade, Abigail became involved in NASA's S'COOL program. S'COOL stands for "Students' Cloud Observations On-line." Abigail, now 14, is a NASA Earth Explorer because she loves science.

Dyuti Sengupta
For Grades 9-12 and up

Summer vacation might be in full swing, but Dyuti Sengupta is working hard with an important goal in mind: using NASA satellite data and other Earth science information to improve the health of forestlands and waterways. Sengupta is a member of a research team formed as part of DEVELOP, a NASA-sponsored internship program in which students conduct pilot projects that demonstrate to community leaders how Earth science data and technology can be applied to local policy issues.

Carlos Del Castillo
For Grades 5-8

Carlos Del Castillo was ready to start his career as an ocean explorer. But shortly after setting sail on his first research cruise he became seasick. You can imagine how upsetting this must have been. He wondered what he would do if his body couldn't handle being on the water. After a few stressful days, however, he recovered and was able to work at sea. Del Castillo is now an ocean scientist at NASA.

James Rattling Leaf
For Grades 9-12 and up

Through traditional customs and symbols like the medicine wheel, a circular arrangement of stones often interpreted as representing the relationship between Earth, air, water and fire, Native Americans have long recognized and celebrated the connectedness among all natural things. James Rattling Leaf, a member of South Dakota's Rosebud Sioux tribe, is helping Native Americans to see interactions between Earth's various components—land, air, water and living things—in a new light.

Classroom Use

NASA Earth Explorers articles are written for three different reading levels: K-4, 5-8, and 9–12 and up. K-4 versions of articles are typically intended as “read to” articles for K-2 or “read alone” articles for grades 3-4. The series is growing, with new articles added each month.

Following are some suggestions for using these articles in K-12 classrooms. Do you have additional ideas for K-12 classroom use? Please e-mail them to dan_stillman@strategies.org. The best ideas will be posted on the NASA Earth Explorers Web site at *http://science.hq.nasa.gov/education/earth_explorers*.

National Science Education Standards

The NASA Earth Explorers Series can be used by K-12 teachers to support the following science content standards (National Science Education Standards, National Research Council, 1995):

Content Standard G: History and Nature of Science
All students should develop understanding of science as a human endeavor.

Grades K-4

- Men and women have made a variety of contributions throughout the history of science and technology.
- Although men and women using scientific inquiry have learned much about the objects, events, and phenomena in nature, much more remains to be understood. Science will never be finished.
- Many people choose science as a career and devote their entire lives to studying it. Many people derive great pleasure from doing science.

Grades 5-8

- Women and men of various social and ethnic backgrounds—and with diverse interests, talents, qualities, and motivations—engage in the activities of science, engineering, and related fields. Some scientists work in teams, and some work alone, but all communicate extensively with others.
- Science requires different abilities and qualities, depending on such factors as the field of study and type of inquiry.

Grades 9-12

- Individuals and teams have contributed and will continue to contribute to the scientific enterprise. Pursuing science as a career or as a hobby can be both fascinating and intellectually rewarding.
- Scientists are influenced by societal, cultural, and personal beliefs and ways of viewing the world.

Introduce or Conclude a Topic

Use the topic index for NASA Earth Explorers to pick an article related to a particular topic (see next panel for list of selected topics). For younger students, the teacher might select and print the articles, setting up a reading center for students to explore; older students could go online to identify and read articles of interest. The articles could be used to set the stage for a topic the class is about to study (e.g., weather) or as a conclusion to a unit, and possible launching point for an independent project.

Develop Communications Skills

Have students read articles and then do one of the following:

- Collect articles from local newspapers that show science as a human endeavor—something that people do, not just an accumulation of facts.
- Write a review of the articles, similar to a book or movie review.
- Go out into their communities, interview scientists, and write an article of their own about a local scientist.
- Invite a local scientist into the classroom so that younger students can learn about what he/she does and then write a class article.

Explore Careers

Have students select several articles to read, or for younger students, the teacher could read the articles to them. Put students in small groups (3-4 per group) and ask them to discuss the following questions:

- What are some of the common characteristics shared by Earth Explorers?

  Possible answers include: curiosity/asking questions; ability to work well/collaborate with others; effective communication skills; someone who believed in and encouraged them (e.g., a parent, relative, teacher or mentor).

- Did any of the Earth Explorers have barriers that they had to overcome? If yes, what were the barriers and how did they overcome them?

  Answers will depend on the articles chosen, and might include expectations (of themselves or by others) because of gender, ethnicity, or physical disabilities; being the first person in their family to go to college; etc.

- How did they become interested in their project or career?
- Did you learn something new or surprising about Earth Explorers? What did you learn?
- What did you find interesting about the Earth Explorers you read about?

Note: Not all articles will include information needed to answer all of these questions.

For Younger Students (upper elementary-middle school)

Have students pick an Earth Explorer to report on to the entire class (this could be done as an individual or group assignment). Or, after reading Earth Explorers articles, students could project themselves into the role of a scientist and write an article about themselves and the discoveries they would like to make. Younger students could draw a picture of themselves making their discovery.

For Older Students (high school)

Ask students to pick a related field that they find interesting (e.g., meteorology, oceanography, city planning, GIS/geospatial technologies). Then have students research the requirements for a job in this field (e.g., what type of degrees/preparation are required, what skills are necessary) and prepare a report. A group/class project might be to develop a resource center (online or hard copy) on science careers.

Topic Index

Following is a list of selected topics related to Earth Explorers feature articles. A complete, updated index of article topics is available at *http://science.hq.nasa.gov/education/earth_explorers*.

Aerosols	Clouds	Hurricanes	Phytoplankton	Tornadoes
Air Quality	Coastal Areas	Measurements-Accuracy & Validation	Polar Regions	Tree Rings/Climate Records
Aircraft	Engineers/Engineering	Meteorologists/Meteorology	Remote Sensing	Urban Growth
Animal Habitats	Forests/Forest Fires	Natural Resources	Sea Ice	Weather
Atmosphere	Geography/Mapping	Oceans/Oceanography	Snow Cover	
Biology	Geospatial Technologies	Ozone	Spacecraft	

Nominate a NASA Earth Explorer!

Tell us about the Earth Explorers you know. We're looking for students, teachers, scientists and others who are working with NASA Earth science data and imagery to better understand our home planet. Send your nominations to Dan Stillman: dan_stillman@strategies.org.

Become a NASA Earth Explorer

A list of NASA-sponsored programs and instructional materials that involve students and teachers in the use of NASA Earth science data and imagery can be found at *http://science.hq.nasa.gov/education/catalog*.

Special thanks to Teresa Hislop, Utah's Electronic High School; Constance Roth, Bay Waveland Middle School, Bay St. Louis, MS; and Linda Webb, retired Maryland elementary school teacher, for contributing to and reviewing the Classroom Use section of this poster.

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